Remarks/Arguments:

The present invention relates to data transmission and reception. Specifically, symbols of a second modulation level (high level) are inserted into a stream of symbols of a first modulation level (low level).

On page 2, the Official Action rejects claims 1-7 and 12 under 35 U.S.C. §102(e) as being anticipated by Krishnamoorthy (U.S. Patent No. 6490270 B1). On page 9, the Official Action rejects claims 8, 9 and 13-16 under 35 U.S.C. §103(a) as being unpatentable over Krishnamoorthy in view of Murakami (U.S. Patent No. 6993092 B1). It is respectfully submitted, however, that the claims are patentable over the art of record for the reasons set forth below.

Krishnamoorthy teaches a transmission scheme which changes it's constellation map (modulation level) on a time slot basis. Specifically, Krishnamoorthy uses a signal modulation method for every single time slot (burst) independently (the bursts are broken up by guard intervals). Murakami teaches a transmission apparatus which determines an interval of inserting a pilot symbol.

Applicants' invention, as recited by claim 1, includes a feature which is neither disclosed nor suggested by the art of record, namely:

> **...inserting at least one data symbol of a second modulation method based on a communication control information into a data symbol stream of a first modulation method...**
>
> **...wherein the second modulation method has more modulation levels than the first modulation method...**
>
> **...wherein a number of data symbols of the first modulation method in a transmission burst is more than a number of data symbols of a second modulation method ...**

Claim 1 relates to a data burst that comprising insertion of high modulation level symbols (second modulation method) into a stream that consists of low modulation level symbols (first modulation method). Specifically, in this burst (stream), there are a greater number of low modulation level symbols than there are of the high modulation level symbols. This feature is found in the originally filed application on at least page 20, lines 1-25 and also in Fig. 2.

In Fig. 2, Krishnamoorthy shows frame structure 201 which includes time slots 203-1 through 203-64. Each of these time slots consist of a data part 205 (data stream) and a guard interval 207 (no data is transmitted). Each data part (data stream) consists of multiple modulation symbols with identical constellation maps (modulation levels). The constellation map of the symbols in the time slots is identical because Krishnamoorthy determines the level of modulation based on each time slot (a preamble is utilized to determine the modulation level before each data burst). For example, data part 205-1 consists of multiple symbols that are modulated in the same manner (for example QPSK). Each of the remaining data parts 205-2 to 205-64 may choose their own modulation scheme. Thus, for each data part (data stream) modulation is performed by a single modulation method. Modulation only changes after a break in the data stream (in another burst) due to guard intervals 207-1 through 207-64. Thus, two different modulation methods can not be inserted in the same data stream (two different modulation methods can only be inserted in two different data streams because of the guard intervals). This is supported in Krishnamoorthys Col. 1, lines 24-44 ("*... constellation mapping scheme employed may be changes on a per-time-slot basis, from time slot to time slot, so that the constellation used to encode the data symbols of each time slot may be different for each time slot within a single frame ... the particular constellation mapping scheme employed for any time slot need to be selected for that time slot only*").

Applicants' claim 1 is different than Krishnamoorthy, because a high level modulation method is inserted into a **stream** of a low level modulation method ("*inserting at least one data symbol of a second modulation method based on a communication control information into a data symbol stream of a first modulation method*"). For example, Applicants' Fig. 2 shows a burst comprising multiple data streams. Specifically, a particular time slot in Fig. 2 comprises one 16QAM signal (high modulation method) inserted into a **stream** of 30 QPSK symbols (low modulation level symbols) (16QAM has more modulation levels than QPSK). Applicants' stream consists of one modulation method inserted directly into another (without separation). Furthermore, the stream of data also comprises mostly low level QPSK symbols with a single high level 16QAM symbol inserted in between (there are more low level symbols than high level symbols in the stream). In contrast, Krishnamoorthys frame as shown in Fig. 2, teaches data parts (data streams) separated by guard intervals. For example, assuming data parts DP1 and DP3 as shown in Fig. 2 of Krishnamoorthy are a low level QPSK modulation, a high level 16QAM inserted into data part DP2 would not be inserted into the stream. This is because the stream between each of the data parts is broken up by the guard interval separation (Krishnamoorthy's

frame is not a stream, because it consists of many streams separated by time (guard intervals)). Please refer to the enclosed explanatory figure that illustrates the differences between Applicants' stream and Krishnamoorthy's frame.

It is because Applicants include the feature of "*inserting at least one data symbol of a second modulation method based on communication control information into a data symbol stream of a first modulation method ... the second modulation method has more modulation levels than the first modulation method ... a number of data symbols in the first modulation method in the transmission burst is more than a number of data symbols of a second modulation method*", that the following advantages are achieved. An advantage is that the appropriate modulation level may be chosen in the middle of a stream on a symbol by symbol basis in order to adapt to channel quality. Accordingly, for the reasons set forth above, claim 1 is patentable over the art of record.

New claims 25-28 have been added to the application. Support for these claims can be found in the originally filed application. No new matter has been added.

Claims 5-8, 10-24, 26 and 28 include all of the features of their parent claims. Thus, claims 5-8, 10-24, 26 and 28 are also patentable over the art of record for the reasons set forth above.

In view of the amendments and arguments set forth above, the above-identified application is in condition for allowance which action is respectfully requested.

Respectfully submitted,

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Attachment: Explanatory Figure

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